



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : H04Q 7/22	A2	(11) International Publication Number: WO 99/66747 (43) International Publication Date: 23 December 1999 (23.12.99)
(21) International Application Number: PCT/SE99/00967 (22) International Filing Date: 4 June 1999 (04.06.99) (30) Priority Data: 60/089,280 15 June 1998 (15.06.98) US 09/114,350 13 July 1998 (13.07.98) US (71) Applicant: TELEFONAKTIEBOLAGET LM ERICSSON (publ) [SE/SE]; S-126 25 Stockholm (SE). (72) Inventor: RAITH, Krister; Park Ridge Road 805-A5, Durham, NC 27713 (US). (74) Agent: ERICSSON RADIO SYSTEMS AB; Common Patent Dept., S-164 80 Stockholm (SE).		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>Without international search report and to be republished upon receipt of that report.</i>
(54) Title: HEADLINE HYPERLINK BROADCAST SERVICE AND SYSTEM (57) Abstract <p>The present invention sets forth a broadcast information service which uses broadcast radiocommunication resources to provide information to a mobile station user. First, a series of broadcast headlines may be transmitted on a broadcast resource for all mobile stations to read. These broadcast headlines are then output in a manner whereby a user can select more detailed information associated with one or more headlines. A request for selected material is transmitted back to the system. The selected material is then sent to the user using any desired information transport mechanism.</p>		

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakhstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

-1-

HEADLINE HYPERLINK BROADCAST

SERVICE AND SYSTEM

5 BACKGROUND

The present invention relates generally to the provision of information services in radiocommunication systems and, more particularly, to efficiently broadcast information services in conjunction with existing radiocommunication services and systems.

10 The growth of commercial radiocommunications has been dramatic over the last fifteen years. Pagers and cellular phones, in particular, stand out as relatively common equipment in many urban settings. These two different types of communication devices, and supporting systems, have evolved from different fundamental purposes, i.e., pagers for traditionally providing one-way, limited
15 information to one or more end users and cellular phones for traditionally providing two-way voice communication service.

As time and technology progress, the traditional functional dividing lines between these two different types of radiocommunication devices have blurred. Pagers have acquired some of the functionality that was traditionally provided by
20 cellular phones and vice-versa. For example, two-way pagers have been developed which permit the pager user to transmit messages to the paging system,

-2-

which messages can then be forwarded to other parties. Similarly, cellular phones have acquired the capability to transmit and receive short (e.g., on the order of 160 alphanumeric character) text messages which can be output on the display of a cellular phone. This evolution in radiocommunication devices has led to the development and marketing of a host of new information services.

For example, paging systems have been implemented which provide for the broadcast of information services, e.g., stock quote information services, to a large number of subscribers that have pagers with displays. These pagers periodically receive information over an air interface associated with a large number of stocks or other financial instruments such as options, futures, etc., and display the current prices of these instruments so that a user can track his or her portfolio's performance.

Applicant anticipates that users of cellular phones would have interest in the provision of similar information services in cellular networks. However, cellular systems, unlike paging systems, have conventionally been designed around the paradigm of (1) limited bandwidth due to a restriction on the spectrum allocated by various governing bodies, e.g., the FCC, for cellular applications and (2) the notion that most of the limited bandwidth be reserved for point-to-point connections (e.g., voice connections) between the cellular phones and the system, with only a relatively small fraction being reserved for broadcast, i.e., point-to-multipoint, transmissions from the system to the cellular phones operating in the system. Due to this latter feature of cellular systems in particular, system designers are very careful regarding the amount of information transmitted on the available broadcast channels and the frequency with which this information is repeated. Thus, the provision of broadcast information services to cellular radiocommunication systems cannot readily be accomplished by the most straightforward approach of simply broadcasting whatever information is desired for all subscribers to display on their cellular phones.

-3-

Consider, for example, a TDMA cellular radiotelephone system, wherein each radio frequency is divided into a series of time slots, each of which contains a burst of information from a data source, e.g., a digitally encoded portion of a voice conversation. By time multiplexing bursts associated with different sources, more than one channel can be supported on each radio frequency. The time slots are grouped into successive TDMA frames having a predetermined duration. The number of time slots in each TDMA frame is related to the number of different users that can simultaneously share the radio channel. If each slot in a TDMA frame is assigned to a different user, the duration of a TDMA frame is the minimum amount of time between successive time slots assigned to the same user.

The successive time slots assigned to the same user, which are usually not consecutive time slots on the radio carrier, constitute the user's digital traffic channel (DTC). As mentioned above, this is typically a point-to-point resource and, in fact, most TDMA systems reserve the majority of the available radio channels for use as DTCs to ensure a large traffic capacity. However, as described in more detail below, digital control channels (DCCHs) are also provided for communicating control signals and overhead information, including a mechanism for connecting to the radiocommunication system and being assigned a DTC.

Similar types of resource allocations are found in other types of cellular systems. For example, in code division multiple access (CDMA) systems, channelization is performed by spreading data associated with a particular connection using a unique spreading code. This code, as opposed to or in conjunction with frequency and time differentiators, provides the receiver with a mechanism for extracting its intended data, i.e., by correlating the received composite signal with the code assigned to its traffic channel. Like TDMA systems, CDMA systems can also provide for broadcast control channels or other overhead signalling channels by allocating known codes thereto. However, like

-4-

TDMA systems, CDMA systems also tend to reserve more resources (e.g., codes and power) for dedicated traffic channels than for broadcast information channels.

Some broadcast information services exist today, although these existing services are specialized services that are not integrated with traditional cellular voice communication systems and which have significant drawbacks associated with such integration. For example, in the context of packet data services, such as CDPD which is deployed in the U.S. cellular spectrum, a service exists which is designed around an efficient encoding, reduced content WEB browser. Using this service, the subscriber will, on a relatively small screen (e.g., less than 10 rows of text), be able to read a small amount of text which are presented in response to queries from the user, i.e., explicit system accesses. Each "page" presented on this screen may have contents that may be further selected.

For example, a displayed stock quote service page may contain a small list of company names. If the user selects a particular company using the keypad, a request is sent over the air using the CDPD service to a special server in the network. The server sends a new page to the mobile with the requested information. This CDPD service resembles the traditional, wire-based Internet web service, the difference being that the special server connected to the CDPD system uses a special language in order to very efficiently present a small amount of information to the user. The special server may extract text information from a traditional WEB page and strip away high bandwidth pictures, color etc. The text is then reformatted and re-encoded in a more bandwidth efficient manner than the HTML language used in describing the information in its original WEB page form, prior to transmission to the remote unit.

This microbrowser concept has evolved from its original form used in CDPD to what is referred to as the Wireless Application Protocol (WAP). The basic concept is, however, still the same. The WAP is designed to be air-interface

-5-

independent (e.g. GSM, IS-136, CDPD etc.) and provides improved flexibility and resource efficiency.

Another technique used in current wireless systems is to build a dedicated system for information retrieval, e.g., the paging systems described above.

5 Unlike cellular systems, in paging systems the basic (and perhaps the only) service provided is the information broadcast service. All of the available information is broadcast to the wireless devices as part of the broadcast service. There is no provision to request further information.

10 This latter paging system approach requires a significant rf bandwidth since all the information has to be broadcasted or, alternatively and more realistically, the amount of information that the user can access must be limited. The trade-off between the amount of data available to the subscriber (e.g., how many stock symbols/prices are transmitted) and the time needed by the user to acquire the full set of information (e.g., how long it takes for the user to receive
15 and cycle through the predetermined number of stock symbols/prices) must be made by the service provider. Moreover, all users get the same information, there is no means to tailor the information for particular users.

The former CDPD/WAP approach requires the user to make an initial access to the system, i.e., a web query. The user must, similar to the traditional
20 WEB usage, store "book-marks" of "pages" of interest. The user typically initiates an access to a particular service e.g. go to a "bookmark". The drawback with this approach is that if there is a particular event happening, the user gets no information unless it polls the service, e.g., a news service.

In the traditional wire-based Internet WEB approach, the remedy to this
25 problem was to introduce a "push" service in which the network based service transmits information to the user which typically is updated as the underlying data is changed. Stock quotes, news events, sports scores are typical applications for the push service. A small "banner" may be allocated to a PC screen which

-6-

constantly is updated with e.g. stock quotes. However, in these wire-based push services, the users must be logged-in to the system from the service server point of view, which uses system resources. Moreover, since these "push" services are wire-based, they typically transmit all available/desirable information relating to the indicated topics at once, which would require significant bandwidth in a radiocommunication application.

Accordingly, it would be desirable to provide techniques and systems which are able to provide broadcast information services within the constraints of existing cellular radiocommunication systems. In particular, it would be desirable to design broadcast information techniques and systems such that they accommodate an end user's desire for a relatively large quantity of data that may need to be updated relatively frequently, while minimizing the usage of scarce broadcast channel resources. Such a system should overcome the disadvantages of traditional paging systems regarding bandwidth utilization, while also not requiring users to make specific system queries before receiving any information.

SUMMARY

Exemplary embodiments of the present invention provide techniques which support broadcast information services via radiocommunication systems using a broadcast resource in an efficient manner. The present invention minimizes the capacity of the broadcast resource that is consumed by the broadcast information service by initially broadcasting only a short headline or summary of a topic, e.g., news is provided in the form of hypertext. The hypertext can be a link (i.e., a URL address) to a WEB site or just a marker for the cellular system local identifier that provides the server with information needed to locate and retrieve the full text associated with the headline.

-7-

If the user selects the headline, an automated request is generated in the mobile station, using e.g. packet data services or a SMS service to request the full text for the subject selected. The request of the full contents can contain a destination address to which the server can send the detailed information, which destination could, for example, be the mobile station cellular identifier or another device, e.g. office e-mail address or fax number in a hotel. The destination address can be specified as a raw address field plus an identifier type field which identifies the type associated with the raw address field, e.g. an e-mail address, a fax number, a mobile cellular identifier, etc.

10 By initially broadcasting only a headline or a summary of a subject, only a small amount of scarce cellular broadcast bandwidth is needed, or equivalently, the time to acquire the subset of detailed information that a particular user might need is reduced to the extent it would be possible at all to send the detailed information using a broadcast channel in a cellular radiocommunication system.

15 According to exemplary embodiments of the present invention, no transmission by the mobile station is required to obtain the headline information, an access is made only if a user requests the detailed information. The present invention utilizes a combination of broadcast channels and point-to-point channels in order to make efficient use of the frequency spectrum and provide an easy-to-
20 use and flexible service to the end-user.

BRIEF DESCRIPTION OF THE DRAWINGS

The above objects and features of the present invention will be more apparent from the following description of the preferred embodiments with reference to the accompanying drawings, wherein:

25 Figure 1 illustrates a generalized view of a digital control channel (DCCH) having time slots which are grouped into superframes;

-8-

Figure 2 illustrates an exemplary radiotelephone system into which the present invention may be implemented;

Figure 3 illustrates a hyperframe structure according which can be used to implement the present invention;

5 Figure 4 illustrates the logical channels of the DCCH which can be used to implement the present invention;

Figure 5 depicts an exemplary format for a broadcast headline hyperlink; and

10 Figure 6 shows a block diagram of a system architecture which can be used to implement exemplary embodiments of the present invention.

DETAILED DESCRIPTION

The following description is written in terms of a cellular radiotelephone system, but it will be understood that Applicant's invention is not limited to that environment. Also, the following description is written in the context of IS-136 compliant, TDMA cellular communication systems, but (as mentioned above) it will be understood by those skilled in the art that the present invention may be implemented in other digital communication applications including those which are designed in accordance with other standards, e.g., GSM or PDC, and those which use CDMA as an access methodology, e.g., IS-95.

20 In particular, exemplary embodiments of the present invention describe techniques and systems for providing broadcast information services which are intended to minimize the usage of the relatively scarce broadcast resources available in existing cellular radiocommunication systems. Accordingly, these exemplary embodiments are described using the broadcast resources available in IS-136, in particular the broadcast SMS channel (S-BCCH). Some of the details associated with IS-136 systems generally and the broadcast SMS channel specifically are described below, while others are omitted to avoid obscuring the

-9-

present invention. However, the interested reader is referred to U.S. Patent No. 5,603,081 to Raith et al. and U.S. Patent Application Serial No. 08/482,754 also to Raith et al. for additional information pertaining to IS-136 related systems generally and broadcast SMS techniques specifically, respectively. The
5 disclosures of both the aforementioned U.S. Patent and U.S. Patent Application are expressly incorporated here by reference.

Figure 1 shows a general example of a forward (or downlink) DCCH configured as a succession of time slots 1, 2, ..., N, ... included in the consecutive time slots 1, 2 ... sent on a carrier frequency. These DCCH slots
10 may be defined on a radio channel such as that specified by IS-136, and may consist, as seen in Figure 1 for example, of every n-th slot in a series of consecutive slots. Each DCCH slot has a duration that may or may not be 6.67 msec, which is the length of a DTC slot according to the IS-136 standard.

As shown in Figure 1, the DCCH slots may be organized into superframes
15 (SF), and each superframe includes a number of logical channels that carry different kinds of information. One or more DCCH slots may be allocated to each logical channel in the superframe. The exemplary downlink superframe in Figure 1 includes three logical channels: a broadcast control channel (BCCH) including six successive slots for overhead messages; a paging channel (PCH) including one
20 slot for paging messages; and an access response channel (ARCH) including one slot for channel assignment and other messages. The remaining time slots in the exemplary superframe of Figure 1 may be dedicated to other logical channels, such as additional paging channels PCH or other channels. Since the number of mobile stations is usually much greater than the number of slots in the superframe,
25 each paging slot is used for paging several mobile stations that share some unique characteristic, e.g., the last digit of the MIN.

Figure 2 represents a block diagram of an exemplary cellular mobile radiotelephone system, including an exemplary base station 110 and mobile station

-10-

120. The base station includes a control and processing unit 130 which is connected to the MSC 140 which in turn is connected to the PSTN (not shown). General aspects of such cellular radiotelephone systems are known in the art, as described by U.S. Patent No. 5,175,867 to Wejke et al., entitled "Neighbor-
5 Assisted Handoff in a Cellular Communication System," and U.S. Patent Application No. 07/967,027 entitled "Multi-mode Signal Processing," which was filed on October 27, 1992, both of which are incorporated in this application by reference.

The base station 110 handles a plurality of voice channels through a voice
10 channel transceiver 150, which is controlled by the control and processing unit 130. Also, each base station includes a control channel transceiver 160, which may be capable of handling more than one control channel. The control channel transceiver 160 is controlled by the control and processing unit 130. The control channel transceiver 160 broadcasts control information over the control channel of
15 the base station or cell to mobiles locked to that control channel. It will be understood that the transceivers 150 and 160 can be implemented as a single device, like the voice and control transceiver 170, for use with DCCHs and DTCs that share the same radio carrier frequency.

The mobile station 120 receives the information broadcast on a control
20 channel at its voice and control channel transceiver 170. Then, the processing unit 175 evaluates the received control channel information, which includes the characteristics of cells that are candidates for the mobile station to lock on to, and determines on which cell the mobile should lock. Advantageously, the received control channel information not only includes absolute information concerning the
25 cell with which it is associated, but also contains relative information concerning other cells proximate to the cell with which the control channel is associated, as described in U.S. Patent No. 5,353,332 to Raith et al., entitled "Method and

-11-

Apparatus for Communication Control in a Radiotelephone System," which is incorporated in this application by reference.

The mobile station 120 also includes an input device 185, such as a numeric keypad, which allows a user to interact with the mobile station. A display device 190, such as an LCD screen, provides a visual display of information to the user. The mobile station also includes memory 180.

In exemplary embodiments of Applicant's invention, the transmission of broadcast information from base stations to mobile stations is structured into successions of different kinds of logical frames. Figure 3 illustrates the frame structure of a forward (base station to mobile station) DCCH according to IS-136 and shows two successive hyperframes (HF), each of which preferably comprises a respective primary superframe (SF) and a respective secondary superframe. It will be recognized, of course, that a hyperframe could include more than two superframes.

Three successive superframes are illustrated in Figure 3, each comprising a plurality of time slots that are organized as logical channels F-BCCH, E-BCCH, S-BCCH, and SPACH that are described in more detail below. At this point, it is sufficient to note that each superframe in a forward DCCH includes a complete set of F-BCCH information (i.e., a set of Layer 3 messages), using as many slots as are necessary, and that each superframe begins with a F-BCCH slot. After the F-BCCH slot or slots, the remaining slots in each superframe include one or more (or no) slots for the E-BCCH, S-BCCH, and SPACH logical channels.

Referring to Figure 3, and more particularly to Figure 4, each superframe of the downlink (forward) DCCH preferably comprises a broadcast control channel BCCH, and a short-message-service/paging/access channel SPACH. The BCCH comprises a fast BCCH (the F-BCCH shown in Figure 3); an extended BCCH (the E-BCCH); and a short-message-service BCCH (the S-BCCH), some of

-12-

which are used, in general, to carry generic, system-related information from the base stations to the mobiles.

The F-BCCH logical channel carries time-critical system information, such as the structure of the DCCH, other parameters that are essential for accessing the system, and an E-BCCH change flag which is described in more detail in U.S. Patent Application No. 08/482,754, which is commonly assigned and incorporated herein by reference; as noted above, a complete set of F-BCCH information is sent in every superframe. The E-BCCH logical channel carries system information that is less time-critical than the information sent on the F-BCCH; a complete set of E-BCCH information (i.e., a set of Layer 3 messages) may span several superframes and need not be aligned to start in the first E-BCCH slot of a superframe. The S-BCCH logical channel carries short broadcast messages, such as stock information, advertisements and other information of interest to various classes of mobile subscriber. According to exemplary embodiments of the present invention, this logical channel may be used to support two-tiered information services, wherein headlines or summaries are broadcast continuously and more detailed information can be broadcast upon demand.

An Exemplary Headline Hyperlink Service

According to the present invention short text descriptions, e.g., headlines, summaries, subjects or the like, can be transmitted on the S-BCCH or a subchannel thereof. Recognizing that broadcast resources on existing cellular systems are scarce, Applicant foresees potential situations wherein the S-BCCH, or its counterpart(s) in other types of systems, has its bandwidth allocated among various broadcast information services, e.g., security quote services, sports information services, etc. Different types of services can be efficiently transmitted in different ways. For example, when the information associated with a particular service consists of a set of updateable values, e.g., securities, sports, weather and

-13-

travel, etc., the information can be channelized and encoded to optimize bandwidth utilization as described in copending, U.S. Patent Application Serial No. _____ to Applicant entitled "Channelization and Encoding for Text Information Services Transmitted Via Radiocommunication Systems", filed on

5 July 10, 1998, the disclosure of which is incorporated here by reference. However, some desirable information may not lend itself as readily to the techniques described therein. For example, news services, which have headlines and articles that may change completely on an hourly basis and have lengthy detailed reports, are not as readily amenable to broadcasting via a series of

10 hierarchical channels.

The present invention provides techniques for addressing these types of broadcast information services. Initially, the system broadcasts a series of short messages which are received by the remote device and used as selectable hyperlinks. These hyperlinks may be displayed on the remote device, e.g., a

15 mobile phone, a wireless PDA, etc. For example, consider a user that wants to follow developments in the telecommunications world. The user may subscribe to a broadcast information service that provides data regarding various topics, including telecommunications and which transmits the following messages (perhaps using some encoding) on an S-BCCH sub-channel, which messages (or

20 portions thereof) are subsequently displayed on the screen of a user's mobile phone as follows:

ERICSSON BUYS MICROSOFT (link id.), LUCENT STOCK.
PLUNGE (link id), AT&T VENTURE (link id.), IS-136 IN CANADA (link id.),
...

25 As seen above, part of the message information broadcast on the S-BCCH subchannel associated with this service is a brief text message description that

-14-

informs the users of the contents of the available, more detailed information (which information has not been broadcast), which brief text message portion can be displayed for selection. Another portion of the transmitted information can be a link identifier, which could, for example, be a valid World Wide Web address (URL). The link identifier may or may not be displayed for selection. Thus, alternatively, a displayed set of messages could read as:

LUCENT STOCK PLUNGES AFTER ANNOUNCING PURCHASE OF MOTOROLA WIRELESS SYSTEM DIVISION,etc.

In this latter example the link identifier is not explicitly displayed and, instead, underlining is used to indicate, to the user, information associated with a link. Thus, in this latter example, two links are identified for one subject. Of course, any visible indicator, e.g., highlighting, can be used. Alternatively, the relationship between a hyperlink and the displayed text can be conveyed by punctuation, e.g., selection of any text between commas will result in a single hyperlink being activated. In any of these exemplary embodiments, selection of a display portion to activate a hyperlink can be accomplished in any desired manner, e.g., positioning a cursor under any letter in the phrase or, using a touch-sensitive screen, pointing to the desired link area.

In addition to the brief description and link identifier, the system may broadcast an indicator of the size of the detailed information associated with each link identification. This will allow the user, or the mobile station, to determine how the detailed information associated with the link should be downloaded based on its size. For example, detailed information which is relatively small in size may use a lower bandwidth service, such as point-to-point SMS, whereas for a larger data block associated with a link, a data service may be selected by the user or by the mobile station in a preprogrammed manner, e.g., wherein the user has

-15-

preselected that data files of less than about 1kByte be sent via point-to-point SMS while data files in excess of 1 kByte should be sent to his or her e-mail address or be sent by setting up a circuit or packet data connection over the radiocommunication system. The mobile station can automatically read the size indicator associated with a link that is selected by a user to determine the downlink mode of delivery for the detailed information that is identified by the hypertext link. Alternatively, the size identifier could be displayed with the short text description as:

ERICSSON BUYS MICROSOFT (22kB), LUCENT STOCK PLUNGE
(10kB), AT&T VENTURE (45kB), IS-136 IN CANADA (180kB), ...

The user may select one of the displayed hyperlinks, e.g., by scrolling through the list with a cursor and depressing a select key when the cursor is underneath a portion of the displayed hyperlink or simply by touching the hyperlink portion of the displayed message if a touch sensitive screen is used in the remote device. Then, the user might be prompted to select a delivery address for the detailed information, e.g., from a list including his or her e-mail, a fax number, etc. or to input an address.

Further, the transmit format of the detailed data associated with the link may be varied depending upon the output device that is associated with downlink delivery mode. For example, if the user or the mobile station selects an SMS delivery mode, then a first lower bandwidth intensive set of information may be delivered. Alternatively, if an e-mail or fax delivery mode is selected, a second higher bandwidth set of information may be delivered. In this context, consider typical web sites which may be graphics/video intensive. If a user selects a hyperlink associated with such a web site, then the graphics may be eliminated and

-16-

only the text sent if SMS delivery is selected, whereas all of the graphics/video may be delivered if a higher bandwidth service, e.g., e-mail, is selected.

Since the headlines are periodically broadcast by the system, a remote user need not access the system, e.g., request a traffic channel, to read the headlines.

5 This avoids any utilization of the uplink control channel or packet data channel capacity for headline browsing. Moreover, users need not log-in to the service server to obtain the headlines, which avoids demand on the radiocommunication system resources. The users are instead activated for a set of headline services by, for example, receiving a corresponding set of encryption keys which may, for
10 example, be sent over the air-interface or entered by the user by means of the keypad. The encryption keys can be changed on a regular basis e.g. once per month. In this way the service provider, which need not be the same as the cellular operator, can make sure that only the paying customers obtain access to specific broadcast services. For further information regarding exemplary
15 techniques for controlling access to this type of broadcast service, the interested reader is direct to U.S. Provisional Patent Application Serial No. _____, to Alex K. Raith, entitled "Broadcast Service Access Control", filed on July 10, 1998, the disclosure of which is incorporated here by reference. Delivery of the corresponding detailed information, after selection by the user of a hyperlink, can
20 have an additional charge imposed by the service provider or be included for free as part of the subscription to the headline service.

As described, exemplary embodiments of the present invention overcome deficiencies of the known systems by (1) providing summary information as a broadcast service and (2) providing detailed information in response to a user
25 request. The set of headlines or subjects for broadcast may be grouped into sets of services which may be subscribed to on a pay-as-you go basis. For example, one service provider could broadcast a series of news headlines on one S-BCCH subchannel, while another service provider broadcasts travel advisory headlines on

-17-

a second S-BCCH sub-channel. Only subscribed services are made available to the mobile user, i.e., the mobile user may subscribe to one service and be able to read a corresponding broadcast sub-channel, but not others.

For the presentation to the user of the headlines, and in particular the detailed information, the remote device may be equipped with a local short range communicator to a laptop or portable computer, e.g. an infrared or a local, low power wireless link. As mentioned above, the request for the detailed information may contain a destination address. The type of destination address may implicitly dictate the mechanism to be used by the system to send the detailed information.

5 This mechanism could, as described above, be an SMS message, or a circuit switched or packet data (e.g. CDPD or GPRS in the GSM system) connection.

Alternatively, the request for detailed information may explicitly request a particular mechanism by which the detailed information should be sent. The destination address can, of course, be the same as or different from the address associated with the requesting remote device. For example, the user may want to direct the detailed information as a fax to a hotel or as an e-mail to its office e-mail system rather than to his or her mobile phone, on which he or she scrolled through the headlines and selected a particular item for which to receive detailed information.

15

The user may set the remote device to wait for a specific indication, e.g., special key series, by the user before issuing a request to the system for the detailed information.

20

In addition to manual interaction with the broadcast service, automated interaction may also occur. For example, the user may set a trigger to specific subjects, e.g. if a stock quote reaches a certain level. When the triggered condition occurs, the remote device may be set to automatically request the detailed information at a predetermined delivery address. When the detailed information is available in the mobile or in a companion device, the user is

25

-18-

alerted. Another exemplary trigger is the appearance of specific word(s) or sets of words in the broadcast headlines, e.g., ERICSSON. The remote device can continuously, or on regular intervals, examine the broadcast headlines to determine whether the trigger word is present. The remote device may alert the user when a trigger event has occurred, thereby allowing the user to decide whether detailed information should be requested, or may be set to automatically request the associated detailed information when it recognizes the keywords in the short text summaries or headlines.

In addition to automatically triggering hyperlinks based on predefined words or phrases transmitted in the brief text descriptions on the broadcast channel, category triggering may also be used. The broadcast information may have, in addition to the text message, link identifier and possibly size of the associated detailed information, a category field. This exemplary format for a broadcast headline hyperlink transmission is illustrated as Figure 5.

For example, a category field value of 001 might indicate that the following text message, and associated detailed information, have been categorized as news, while a category field value of 002 might indicate that the following text message, and associated detailed information, relates to sports. This field can also be used for automatic hyperlink activation, e.g., for all headlines associated with a predetermined category value, the detailed information can be requested.

In addition to providing automatic hyperlink selection, requests for additional information can be accumulated by the remote device prior to sending a request, e.g., on a control channel, for detailed information associated with various hyperlinks. Of course, the remote device could also send requests as hyperlinks are selected (either manually by the user or based upon some preprogrammed triggering function as described above), however by gathering several requests at once, it becomes possible to select several subjects before

-19-

making a single access to the system, which in turn should reduce congestion and increase efficient bandwidth utilization.

Each broadcast headline and its associated link identification, may have a number of detailed information files associated therewith. For example, a service
5 broadcasting links associated with a newspaper may have various daily articles, etc. that are all available at a particular web site. In such a case, according to exemplary embodiments of the present invention, it is possible to reduce the amount of information transmitted back on the uplink by a mobile station user in its request, when that user desires a number of detailed information files from the
10 same source or location. This can be accomplished by providing local identifier numbers, instead of repeating complete link addresses, which can then be transmitted as part of the request.

For example, if the hypertext link broadcast by the system provides local numbers 1-6 and the mobile station returns the generic hypertext link address as
15 its request with no local numbers, then the system can assume that the mobile station wants all six detailed information chunks. Alternatively, if the mobile station sends the generic hypertext link with local numbers one and two, then the system knows which two detailed information files are desired by the mobile station without repeating the entire address associated with the website or source.
20 Interpretation of the local numbers may be supported by the cellular switch and may require routing therethrough.

As mentioned above, the broadcast service provider and the cellular network operator may be different entities and may have different equipment, which equipment can be used in a variety of ways to provide broadcast
25 information services according to the present invention. Consider the exemplary system architecture illustrated in Figure 6. Therein, a service provider's equipment 60 is linked via a communication network 62, e.g, the Internet, to a radiocommunication network as represented by mobile switching center (MSC)

-20-

64. The MSC 64 may have connected thereto (or integral therewith) a special service server 66 for handling broadcast information services. The MSC 64 is connection to a plurality of radio base stations (RBS) 68 only one of which is illustrated in Figure 6 for simplicity. One or more radio base stations 68 support
5 radio communications with a remote device, e.g., mobile station 70.

According to one exemplary embodiment, the contents broadcast to support a broadcast headline hyperlink service as described above are stored locally, e.g., on the service server 66. This information may be initially downloaded through the Internet 62 from the service provider's equipment 60 when an agreement is
10 reached between the network operator and the service provider. In any event, in this case the service server 66 handles the provision of information to be broadcast by the RBS 68 on one or more broadcast resources, e.g., S-BCCH subchannels. The service server 66 also processes requests for detailed information transmitted from the remote device 70. Since the service server 66 is, in this exemplary
15 embodiment, handling the entire exchange of information without interaction with the service provider's equipment 60, local numbers can be broadcast by the system and used in requests by the remote device.

According to another exemplary embodiment of the present invention, the information broadcast by the radiocommunication system is stored externally, i.e.,
20 on the service provider's equipment 60. In this case, the service server 66 may act as a translator which passes requests for information to the service provider's equipment 60. For example, the service server may store a map of link identifiers in its memory, each of which being assigned a different local number. The service server may then broadcast text message headlines and local numbers as
25 link identifiers. When a request for detailed information is returned, along with a local number, the service server 66 translates the local number into an explicit link identifier, which the service provider's equipment 60 will understand, and forwards the request for detailed information. In this exemplary embodiment, the

-21-

service server 66 may also handle packaging and delivery of the detailed information after it is delivered by the service provider's equipment 60 through the communication network 62.

According to a third exemplary embodiment, the service server 66 can be eliminated and the service provider's equipment can provide all of the desired intelligence for packaging information to be broadcast on a particular subchannel(s) and handling requests for detailed information. In this exemplary embodiment, the MSC 64 accepts headline information to be broadcast directly from the service provider's equipment 60 and passes requests thereto. The service provider's equipment 60 may group information into categories as described above.

While the present invention has been described with respect to a securities quote service, one skilled in the art will appreciate that the invention would equally apply to other such systems where information is broadcast to a user. For example, although the previous exemplary embodiments focus on the output of the headlines as short text messages on a display, those skilled in the art will appreciate that they could be output as speech using an SMS-to-speech converter. Additionally, although it is desirable to provide selection capability for additional information, a read-only device could be used to read the broadcast headlines. Moreover, the way in which logical channels are linked to existing channel structures may be readily varied and adapted to different systems. Many variants and combinations of the techniques taught above may be devised by a person skilled in the art without departing from the spirit or scope of the invention as described by the following claims.

-22-

WHAT IS CLAIMED IS:

1. In a radiocommunication system having a broadcast resource, at least one mobile station having a display and an input device, a method for providing an information service to said mobile station, said method comprising
5 the steps of:
transmitting a text message including one or more links to additional information elements;
displaying said text message including said one or more links;
selecting one or more of said one or more displayed links associated
10 with said text message; and
sending a request, to said radiocommunication system, for additional information associated with said selected one or more links.
2. The method of claim 1, wherein said broadcast resource is a sub-channel of a S-BCCH in a TDMA radiocommunication system.
- 15 3. The method of claim 1, wherein said broadcast resource is a CDMA broadcast resource.
4. The method of claim 1, wherein said step of transmitting further comprises the step of:
transmitting, with said text message, one or more link identifiers
20 associated with said one or more links.
5. The method of claim 4, further comprising the step of:
displaying, with said text message, said one or more link identifiers.

-23-

6. The method of claim 1, wherein said step of transmitting further comprises the step of:

transmitting, with said text message, a size identifier associated with said additional information.

5 7. The method of claim 6, further comprising the step of:
displaying, with said text message, said size identifier.

8. The method of claim 1, wherein said step of selecting further comprises the step of:
touching a portion of said display to select said one or more links.

10 9. The method of claim 1, wherein said step of sending a request further comprises the step of:
including in said request said one or more link identifiers associated with said one or more selected links and a destination address for said additional information.

15 10. The method of claim 1, wherein said step of sending a request further comprises the step of:
including in said request said one or more link identifiers and a destination mechanism for said additional information.

20 11. The method of claim 10, wherein said destination mechanism is point-to-point SMS.

12. The method of claim 10, wherein said destination mechanism is e-mail.

-24-

13. The method of claim 9, wherein said destination address is different than an address associated with said remote station.

14. The method of claim 1, wherein said step of transmitting further comprises the step of:

5 transmitting, with said text message, a category field.

15. The method of claim 1, wherein said step of selecting further comprises the step of:

10 automatically selecting said one or more links by recognizing, in said mobile station, a keyword in said text message.

16. The method of claim 14, wherein said step of selecting further comprises the step of:

automatically selecting said link by recognizing, in said mobile station, a predetermined value in said category field.

15 17. The method of claim 10 further comprising the step of:

selecting a first destination mechanism if a size of said additional information is less than a predetermined amount and otherwise selecting a second destination mechanism.

18. The method of claim 17, wherein said first destination mechanism
20 is point-to-point SMS and said second destination mechanism is a packet data connection.

19. A mobile station comprising:

-25-

means for receiving, while in idle mode, a headline hyperlink transmitted on a broadcast resource;

means for outputting a text message associated with said headline hyperlink;

5 means for selecting said headline hyperlink; and

means for transmitting a request for additional information associated with said headline hyperlink.

20. The mobile station of claim 19, wherein said headline hyperlink is provided from one or more information service providers providing one or more headline services which said mobile station is eligible to receive.

21. The mobile station of claim 20, wherein said headline hyperlink and said additional information are encrypted.

22. The mobile station of claim 20, wherein said means for receiving is further configured to receive one or more encryption keys corresponding to said one or more headline services.

23. The mobile station of claim 22, wherein said one or more encryption keys are provisioned using OATS.

24. The mobile station of claim 23, wherein said means for selecting further includes a numeric keypad, and wherein said one or more encryption keys are provisioned using said numeric keypad.

25. The mobile station of claim 24, wherein said one or more encryption keys are periodically changed.

-26-

26. The mobile station of claim 25, wherein said means for transmitting said request is configured to transmit said request when one or more additional requests are accumulated.

5

27. The mobile station of claim 20, wherein said one or more headline services are provided in one or more groups according to headline topic.

28. The mobile station of claim 27, wherein said mobile station subscribes independently to each of said one or more groups according to headline topic.

10

29. The mobile station of claim 28, wherein said broadcast resource is divided into one or more logical subchannels and wherein said each of said one or more groups is transmitted on a separate one of said one or more logical subchannels.

15

30. The method of claim 1, wherein said link is a Universal Resource Locator.

31. The method of claim 5, wherein said step of displaying further includes the step of displaying one or more text messages having one or more link identifiers associated therewith and a cursor.

20

32. The method of claim 31, wherein said step of selecting further includes the step moving said cursor to a particular one of said one or more link identifiers to select said particular one of said one or more link identifiers.

-27-

33. The method of claim 31, wherein said step of displaying further includes the step of displaying said one or more text messages and said associated one or more link identifiers in a list.

5 34. The method of claim 33, wherein said step of selecting further includes the step of scrolling said cursor through said list to identify a particular one of said one or more link identifiers to select.

35. The method of claim 34, wherein said step of selecting further includes the step of selecting said particular one of said one or more link identifiers by engaging a select key.

10 36. The method of claim 9, wherein said step of sending a request further comprises the step of:
providing a prompt for said destination address.

37. The method of claim 36, wherein said step of sending a request further includes the step of:
15 providing a prompt for a delivery format for said additional information.

38. The method of claim 36, wherein said step of providing a prompt for said destination address further includes the step of selecting said destination address from a list of one or more destination addresses.

20 39. The method of claim 37, wherein said delivery format includes a text only SMS format.

-28-

40. The method of claim 17, further comprising the step of selecting a first delivery format if said size of said additional information is less than a predetermined amount and otherwise selecting a second delivery format.

5 41. The method of claim 40, wherein said first delivery format is a point-to-point SMS format and wherein said second delivery format is a packet data connection.

42. The method of claim 9, wherein said destination address is preprogrammed.

10 43. The method of claim 42, wherein said delivery format is based upon said preprogrammed destination address.

44. The mobile station of claim 19, wherein said mobile station further comprises a local communications link.

15 45. A radiocommunication system comprising:
a broadcast resource; and
at least one mobile station including a transceiver and a display device,
said at least one mobile station configured to:
receive broadcast information from said broadcast resource, said
broadcast information including an information element having one or more links
20 to one or more additional information elements associated with said received
information element;
request said one or more additional information elements by
selecting one or more of said one or more links.

-29-

46. The radiocommunication system of claim 45, wherein said mobile station further includes an input device and wherein said mobile station is further configured to provide a destination address to send said requested one or more requested additional information elements.

5 47. The radiocommunication system of claim 46, wherein mobile station further includes a local communication link and wherein said destination address further includes a device address for said local communications link.

 48. The radiocommunication system of claim 47, wherein said mobile station is further configured to wait for an input from said input device before
10 making said request for said one or more additional information.

 49. The radiocommunication system of claim 47, wherein said mobile station is further configured to trigger on a predetermined trigger condition.

 50. The radiocommunication system of claim 48, wherein said predetermined trigger condition includes said information element containing a
15 predetermined value.

 51. The radiocommunication system of claim 50, wherein said information element includes a headline and wherein said predetermined value includes one or more words included in said headline.

 52. The radiocommunication system of claim 49, wherein said
20 predetermined value further includes a category.

-30-

53. The radiocommunication system of claim 52, wherein said mobile station is further configured to provide an alert when said predetermined trigger condition occurs.

5 54. The radiocommunication system of claim 53, wherein said alert further includes a prompt for determining whether said mobile station should request said one or more additional information elements.

55. The radiocommunication system of claim 49, wherein said mobile station is further configured to request said one or more additional information elements when said predetermined trigger condition occurs.

10 56. The radiocommunication system of claim 55, wherein said one or more additional information elements are broadcast to a predetermined destination address when said predetermined trigger condition occurs.

15 57. The radiocommunication system of claim 56, wherein alert further includes a notification representing when said one or more additional information elements are available.

58. The radiocommunication system of claim 57, wherein said mobile station is further configured to associate each of said one or more additional information elements with a local identifier.

20 59. The radio communication system of claim 58, wherein said mobile station is further configured to request one or more of said one or more additional information by one or more local identifiers.

-31-

60. The radio communication system of claim 59, wherein said mobile station is further configured to request all of said one or more additional information elements if said one or more local identifiers is not provided.

5 61. The radiocommunication system of claim 45, wherein said broadcast resource further includes a service server and wherein said service server is configured to store said information element and said one or more additional information elements.

10 62. The radiocommunication system of claim 61, wherein said service server is further configured to download said information element and said one or more additional information elements from a service provider.

63. The radiocommunication system of claim 62, wherein said service server is further configured to download said information element and said one or more additional information elements from a network connection.

15 64. The radiocommunication system of claim 63, wherein said network connection further includes an Internet connection.

20 65. The radiocommunication system of claim 61, wherein said broadcast resource further includes one or more logical channels and wherein said service server is further configured to provision said information element and said one or more additional information elements into said one or more logical subchannels.

-32-

66. The radiocommunication system of claim 61, wherein said service server is further configured to process said requests for said one or more additional information elements.

5 67. The radiocommunication system of claim 66, wherein said service server is further configured to associate each of said one or more additional information elements with a local identifier.

68. The radiocommunication system of claim 67, wherein said service server is further configured to process said requests for said one or more
10 additional information elements according to said local identifier.

69. The radiocommunication system of claim 61, wherein said service server is coupled to a service provider, and wherein one or more additional information elements are stored on said service provider.

70. The radiocommunication system of claim 69, wherein said service
15 server is further configured to store said one or more links and wherein each of said one or more links are associated with said one or more additional information elements stored on said service provider using a link identifier.

71. The radiocommunication system of claim 70, wherein said service server is further configured to associate each of said one or more additional
20 information elements with a local identifier.

72. The radiocommunication system of claim 71, wherein said service server is further configured to store a map of said link identifiers associating each

-33-

of said one or more links with one or more additional information elements using said local identifier.

73. The radiocommunication system of claim 72, wherein said service server is further configured to translate said requests from said mobile station
5 using said map from said one or more selected links to one or more local identifiers.

74. The radiocommunication system of claim 73, wherein said service server is further configured to transfer said requests from said mobile station to said service provider using said translated requests.

10 75. The radiocommunication system of claim 74, wherein said service server is further configured to translate said one or more local identifiers to one or more specific link identifiers.

76. The radiocommunication system of claim 75, wherein said broadcast resource further includes one or more logical channels and wherein said
15 service server is further configured to provision said one or more additional information elements transferred from said service provider to said service server in response to said request into said one or more logical subchannels.

77. The radiocommunication system of claim 45, wherein said broadcast resource further includes a service provider and wherein said service
20 provider is configured to store said information element and said one or more additional information elements.

-34-

78. The radiocommunication system of claim 77, wherein said wherein
said broadcast resource further includes one or more logical channels and wherein
said service provider is further configured to provision said information element
and said one or more additional information elements into said one or more logical
5 subchannels.

79. The radiocommunication system of claim 78, wherein said
broadcast resource further includes a Mobile Switching Center (MSC), wherein
said information element further includes a headline, and wherein said service
provider is further configured to provide said MSC with said headline for
10 broadcast to said at least one mobile station.

80. The radiocommunication system of claim 79, wherein said MSC is
further configured to:
receive said requests for said one or more additional information elements
from said at least one mobile station; and
15 transfer said requests to said service provider.

81. The radiocommunication system of claim 79, wherein said service
provider is further configured to group said information element into one or more
categories.

82. The radiocommunication system of claim 80, wherein said service
20 provider is further configured to respond to said requests by providing said one or
more additional information elements to said MSC.

83. The radiocommunication system of claim 82, wherein said mobile
station is further configured to provide a destination address representing a

-35-

delivery destination for said on or more additional information elements, and wherein said MSC is further configured to accept said destination address and deliver said one or more additional information elements provided by said service provider said destination address.

- 5 84. The method of claim 1, wherein said step of transmitting is repeated periodically.

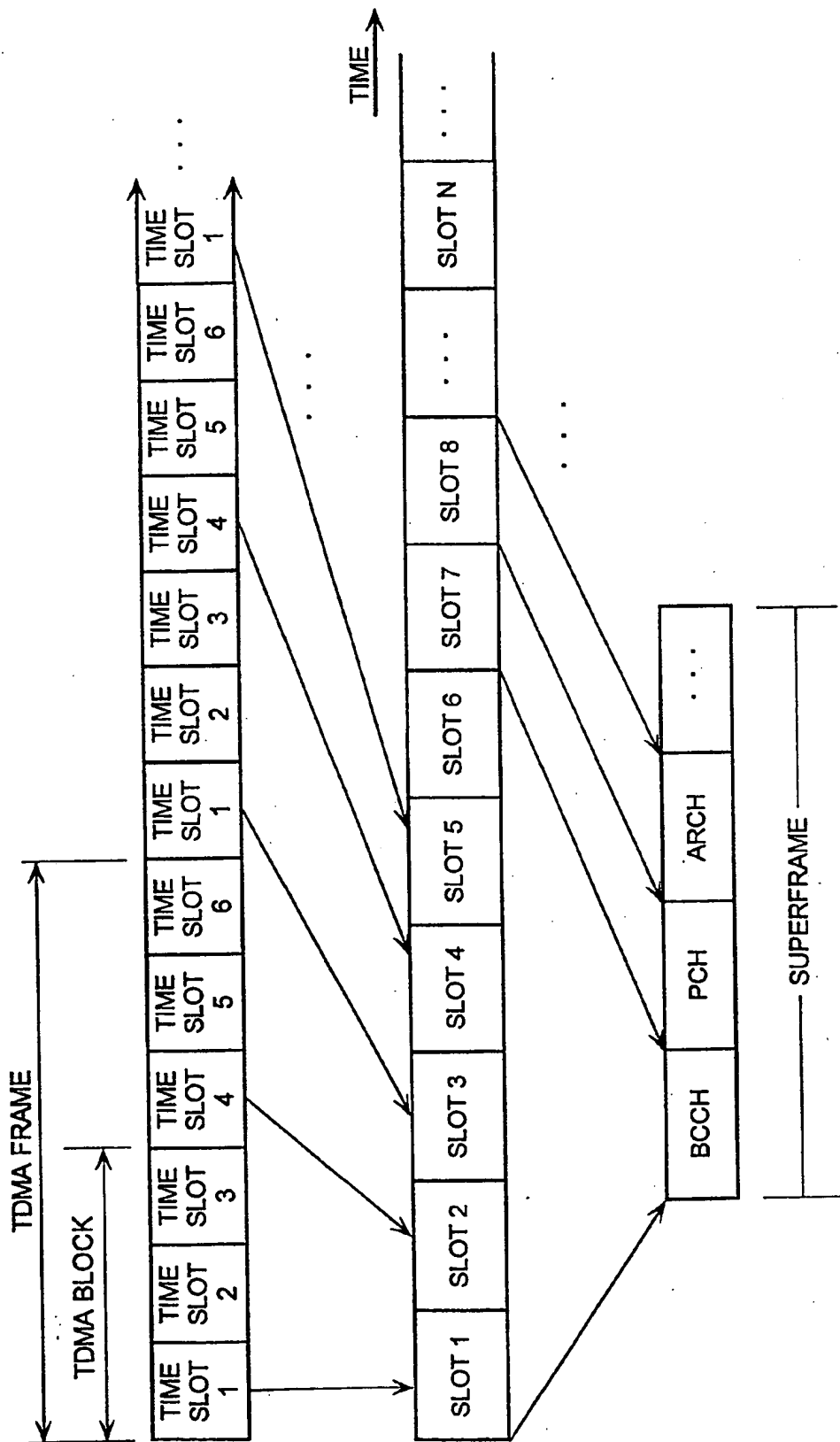


FIG. 1

2/4

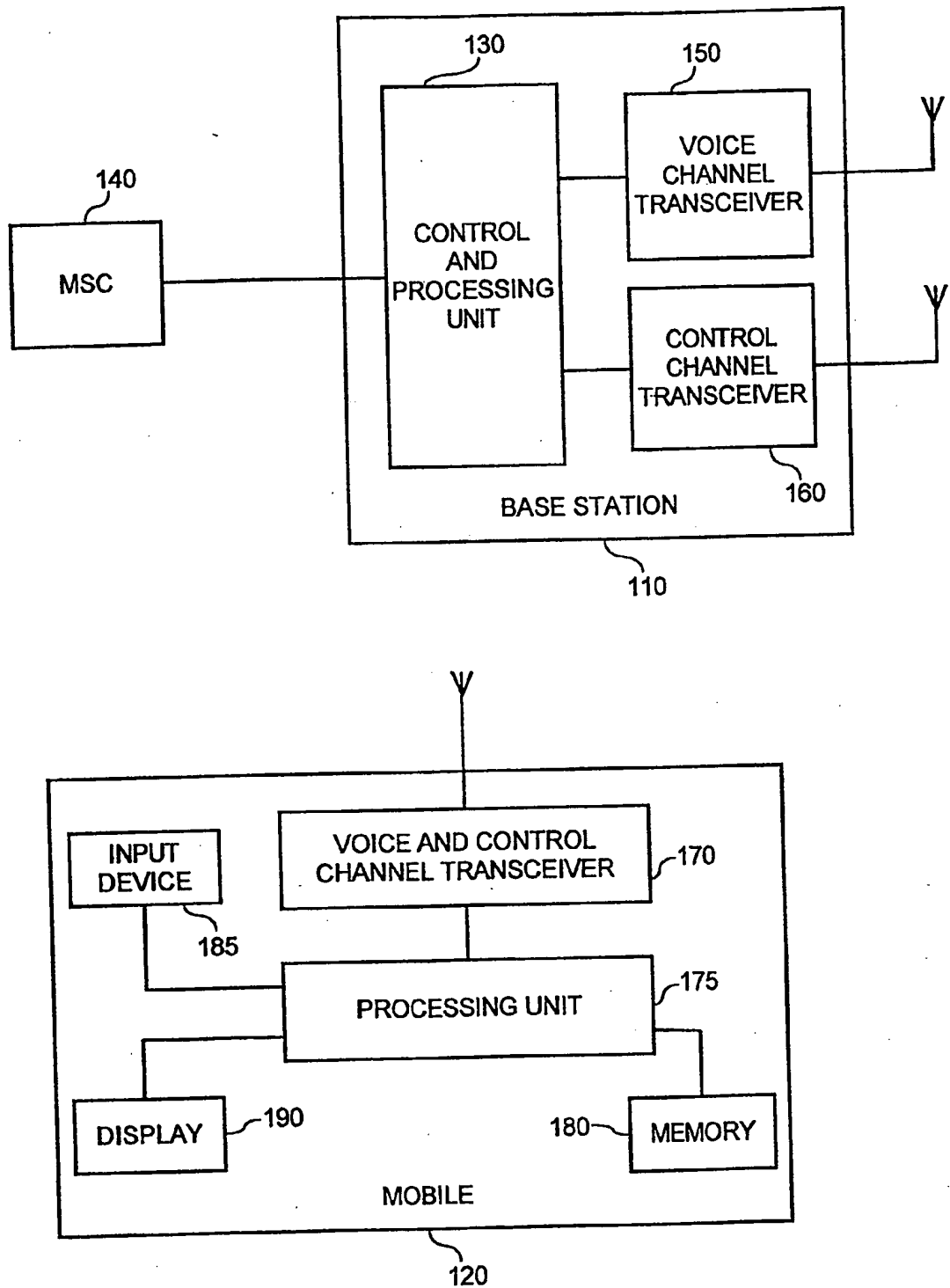
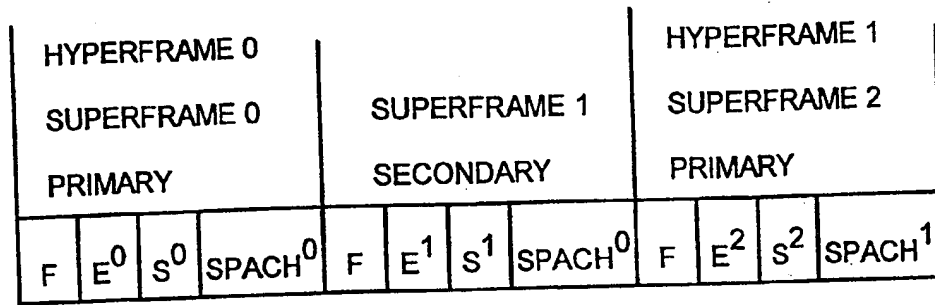


FIG. 2

SUBSTITUTE SHEET (RULE 26)

3/4



F = F-BCCH

E = E-BCCH

S = S-BCCH

SPACH = PCH OR ARCH OR SMSCH

FIG. 3

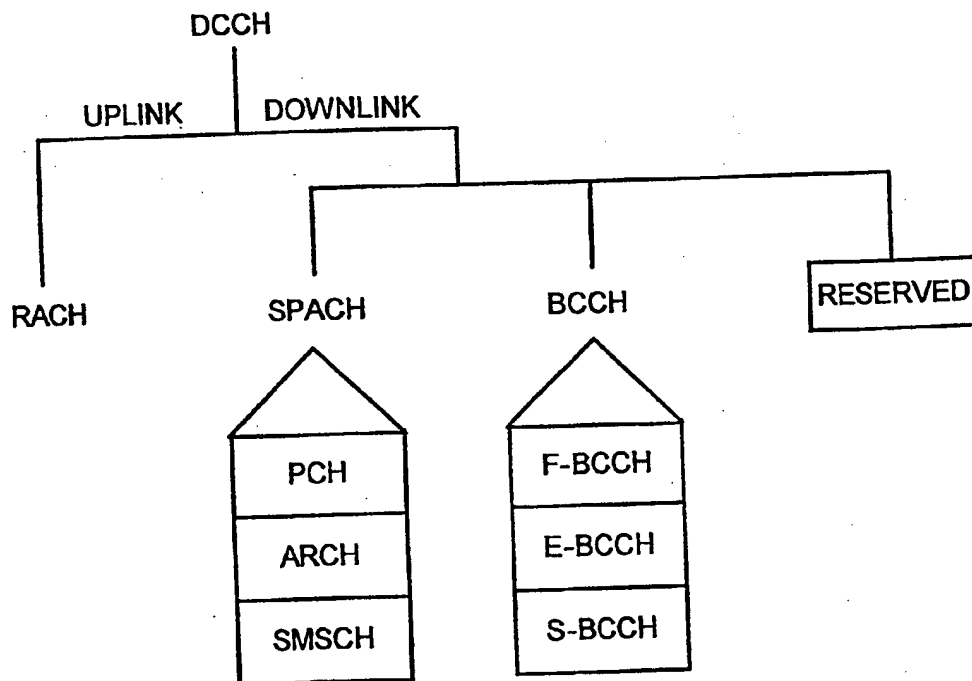


FIG. 4

4/4

CAT.	TEXT MESSAGE	LINK ID	SIZE
------	--------------	---------	------

FIG. 5

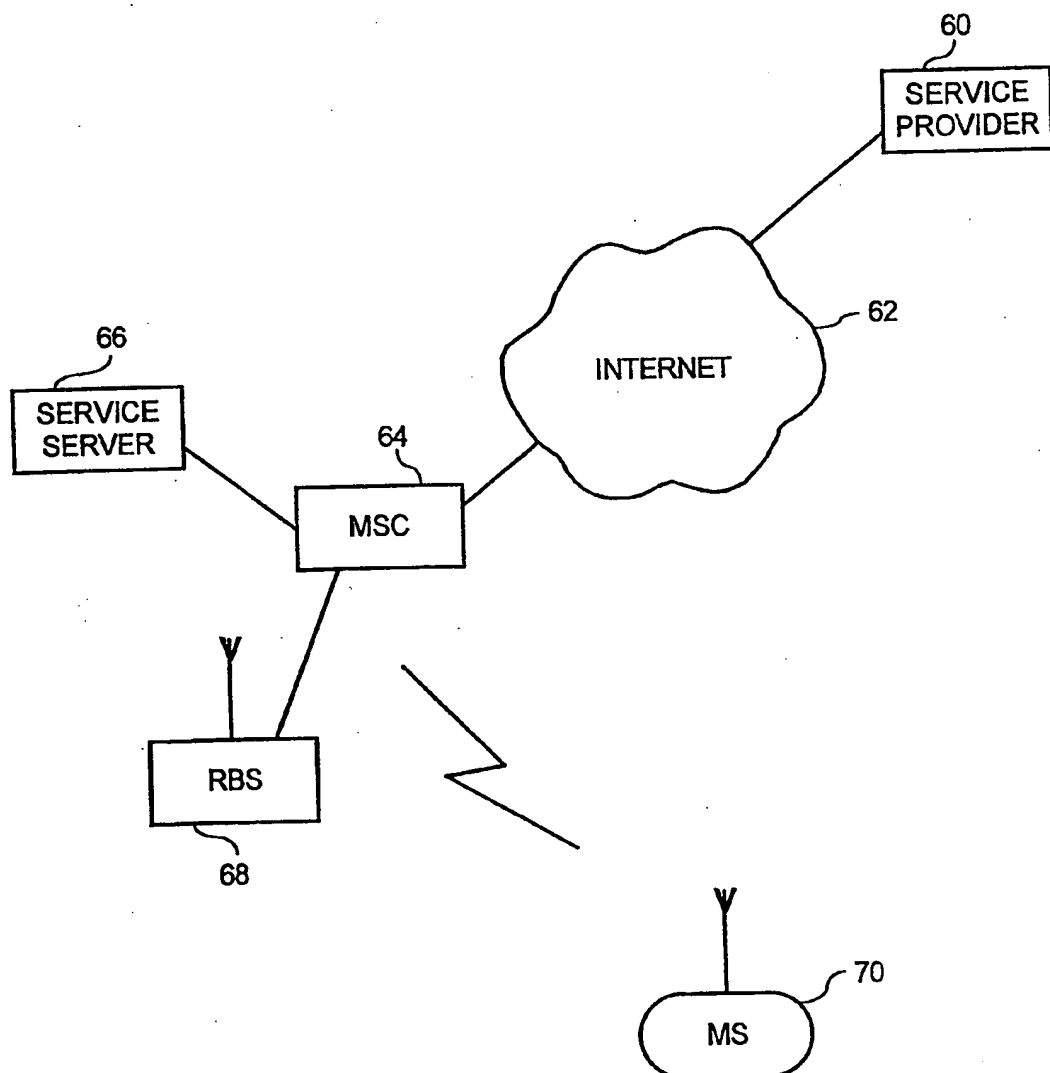


FIG. 6

SUBSTITUTE SHEET (RULE 26)